

μ RTube: a new geometry concept for MPGD technologies

Friday, 31 May 2024 15:37 (1 minute)

This project aims to develop a new detector concept that optimizes the Micro Pattern Gas Detector (MPGD) geometry for low cost and large area applications while keeping the same performance. The goal of the project is to carry out a full proof-of-concept of a tubular μ RWELL detector (μ Rtube) and demonstrate its advantages studying specific applications. The project exploits the best features of several technologies, into an innovative geometry concept which allows for a sensible reduction of the number of electronics channels per unit area. The base element (a μ Rtube) is a cylindrically shaped gaseous detector. The internal surface is about 0.9cm in radius and contains a μ RWELL, which works as an amplification stage and readout. The external sleeve is 18 cm in diameter and accommodates the cathode, completing a radial tubular TPC having a small internal surface used for the readout. The μ Rtube will bring the MPGD technology to the unprecedented curvature radius (~ 1 cm) for imaging and particle identification applications. The detection technique of the μ Rtube is based on the TPC approach where time information is used to reconstruct the ionizing particle path inside the drift volume. A radial electric field between cathode and anode is created, as in a wire detector: the field lines converge on the anode, which is segmented in strips or pads. Thanks to the convergence of the field lines, the electron diffusion is sensibly reduced with respect to a planar μ RWELL. This allows for a readout of a large volume with a smaller number of electronic channels: a μ Rtube with 128 electronic channels will perform imaging in a cylinder of 18 cm diameter. Report on the detector concept, a full simulation of the detector and a validation with a testbeam will be presented

Collaboration

Role of Submitter

I am the presenter

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Session Classification: Gas Detectors - Poster session

Track Classification: T6 - Gas Detectors